Solve for Tomorrow Activity Plan

To participate in Phase Two, State Finalists must complete an activity plan.

The objective of the Phase Two Activity Plan is to outline how you and your students will create a video addressing the contest challenge: **"Show how STEM can be applied to help improve your local community."**

The activity plan can be no longer than **three pages** in length. Each eligible activity plan submitted will be judged to determine which entries will advance to Phase Three.

Please note that the activity plan you submit MUST be the project that you carry out and record on video. State Winners will be selected based on the activity plans submitted. Any videos created that are different from the activity plans submitted will be disqualified.

PART 1: APPLICANT INFORMATION

Please complete the form below (no blanks).

Applicant's Name: Richard Dudley
Grade Level of Students Participating in Project: 11-12 (STEM Elective)
School Name: Coventry High School
School Address (include city, state, ZIP) **3089 Manchester Rd.** **Akron, OH 44319**
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PART 2: ACTIVITY PLAN

Concept Overview:

We enjoy living, working, and playing on and around our beautiful Portage Lakes. Our 1.6 square miles of fresh water lakes provide recreation in the forms of fishing, skiing, swimming, camping, and boating. Many homes, new ones and old ones, surround most of our natural and manmade lakes. Where there are many people, there are many business opportunities. Many people gather on our lakes at popular bars, restaurants, and other locations. Many migratory birds and other native wildlife depend heavily on this unique aquatic and wetland environment. Because so many use our Portage Lakes, our environmental concerns for our community are increasing every year. Our students at Coventry High School will be working to gain a better understanding of the anthropological impact on our aquatic resource, and will be using a critical water source on our school property and nearby lakes to implement and innovate "best management practices." Students will explore the effectiveness of "floating wetland" designs as well as other feasible strategies to reduce problems associated with nutrient runoff and local contamination. Real data will be collected on our local water quality and concerns will be identified throughout our local lakes. Scientifically proven methods of water management, including constructed floating wetlands, will be introduced and promoted to various groups in our community to educate, encourage, and assist in the widespread use of these practices.

Activities:

Our students will explore the local neighborhood and lake community of their high school, identifying areas of concern associated with the water resource shared by so many. They will use hand held GPS devices and a GPS video recorder to identify "hot spots" in the region that will be documented and used for benchmark data points for future investigations and assessments. By creating .kml/kmz files through Google Earth they will investigate and communicate current areas of concern. GPS video documentation and geotagged images of critical areas within our lake community will be gathered for evidence of change that will take place over time. For an example of this emerging strategy, we will refer to the work of Andrew Curtis and his research after Hurricane Katrina, http://www.nytimes.com/interactive/2010/08/27/us/lower9th-5year-anniversary.html. Our students will be supported by Jacqueline Curtis, spouse and research partner of Mr. Curtis. Future STEM projects will continue to record and track the progress and impact of our strategies on these same critical areas.

A visit from our local EPA surface water expert, Bill Zawiski, will help students gain a better understanding of current concerns and strategies related to storm water and runoff affecting our property and the rest of Portage Lakes. He will also act as a professional mentor for us all.

To better understand the impact to our local water sources, students will use GLOBE protocols for measuring characteristics of water, http://www.globe.gov/do-globe/globe-teachers-guide/hydrosphere. Critical measurements such as dissolved oxygen, alkalinity, conductivity (TDS), temperature, pH, turbidity, and Nitrate levels will reveal the true condition of our water source as well as provide a benchmark for future investigations. Students will seek the support and expertise of Dr. Susan Kohler, GLOBE Instructor with NASA Glenn Research Center in Cleveland, Ohio. Future STEM students will continue to monitor water quality and will revisit original "hot spots" to report on changes over time. They will continue to explore future progress, and recommend modifications and improvements in local water management practices, carrying on the campaign for improving water quality.

Teams will also be required to develop and conduct a survey to discover current attitudes and practices of residents of Portage Lakes. This data will be compared to similar surveys conducted by future STEM students. Students will look for changes in attitudes and activities of those using the lakes over time as a result of efforts to inform and implement improved practices.

Teams of students will research, design, and build floating (constructed) wetlands from a variety of materials, with special incentives to use recycled materials in their prototypes. Their constructed wetland will be tested, evaluated, and monitored for performance and marketability. Local native wetland plants will be harvested, with permission, to use in our constructed wetlands.

Floating wetland designs, and the evidence gathered based on effectiveness, will be shared with and promoted to the community. Teams will develop and deliver presentations and products for a specific community group, classroom, resident, or lakeside business.

Activities: Community Impact

By quantifying and documenting the impact we have on our local aquatic environment, residents will have a better understanding of their impact on the water quality of our Portage Lakes. They will also be informed and encouraged to take action by putting in place the innovations provided by our Coventry High School STEM students. Over time, with persistence from our ongoing STEM initiative, our residents, visitors, and business owners will take measures to improve poor water conditions and enjoy the many benefits of floating wetland islands and other best management practices. Many of those residing on our lakes will work together to remove excess nutrients from runoff and contaminations from nearby residential areas. They will either use floating wetlands produced by our STEM students or make their own based on our plans and recommendations. Our work will not only improve local water quality, but will also create a change in the attitude and actions of our neighbors regarding our most precious resource in Coventry Township.

Assessment:

Our Teams of students will identify and document water quality concerns in our community and will develop constructed floating wetlands to promote to the community as a verified means of improving the problem of eutrophication and contamination.

Student knowledge and attitudes concerned with water quality issues will be measured prior to this project as well as after this activity. This data will reveal the effectiveness of the overall project. These assessments will cover topics such as human impact on our local and global aquatic ecosystems, characteristics indicating water quality, and best management practices.

Student work will be supported by actual data gathered and presented in data tables and appropriate graphs for analysis. They will have an effective constructed floating wetland structure located in an area of high visibility, and must demonstrate the positive impact of their design to a vital part of their community.

Each student and team will be evaluated based on the content, effectiveness, and delivery of a presentation, website, or video documentary that will share their work, promote strategies, and encourage others in the community to utilize these strategies and innovations.
Formative project rubrics will evaluate team performance throughout the project and will help to guide students and collaborative teams towards achieving their objectives.

Our project video will capture every critical aspect of our work. Students will not only demonstrate sound scientific practices, but will also model responsible environmental citizenship. The produced video will include:

- the investigative process of identifying critical areas and issues related to water quality
- documentation of critical concerns (creation of video and Image GPS files)
- collection and analysis of local water quality and the origin of baseline data
- surveys of attitudes and activities of current residents
- research and innovation of “best management practices,” emphasizing constructed floating wetlands
- student development and designs and prototypes of floating wetlands
- student outreach to share their work, concerns, and solutions with various community members